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TRILOBITES FROM THE KEOKUK LIMESTONE (MISSISSIPPIAN) OF MISSOURI

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ABSTRACT

A new species of the trilobite genus *Griffithides* Portlock, *G. salinensis,* new species, is described. *G. salinensis* is a rare component of the fauna of the Keokuk Limestone (Mississippian) of St Genevieve County, Missouri. It can be distinguished from other described species assigned to this genus by the posterior termination of the pygidial axis, which is upturned into a large node-like projection. The type specimens of this species were collected from just below the *Marginarugus magnus* bed of the Keokuk Limestone. In addition to *G. salinensis,* two specimens also recovered from the same bed are described and tentatively assigned to the genus *Waribole* Richter and Richter.

INTRODUCTION

The trilobite genus *Griffithides* Portlock is relatively poorly known from Carboniferous rocks of North America as compared to the many species recognized from correlative rocks of Europe. Of the three North American species recognized, only one, *G. bufo* Meek and Worthen, is known from more than just the type material. In contrast, specific diversity exhibited by this genus in Europe has prompted some authors (Hahn and Hahn, 1970, 1971; Hahn et al., 1983) to subdivide the genus

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into a number of subgenera. The recent recovery from the Keokuk Limestone of Missouri of a small number of specimens of *Griffithides,* which are notably dissimilar to previously recognized species, warrants the erection of a new species. The specimens of *Griffithides,* and two pygidia tentatively assigned to the genus *Waribole* were recovered from a light-gray lime grainstone in the Keokuk Limestone along Interstate 55 at Little Saline Creek, St. Genevieve County, Missouri. The specimens were recovered as accessories during field collections made for brachiopods by J. L. Carter and A. D. Kollar (Carnegie Museum of Natural History) from a bed just below the *Marginarugus magnus* bed or about in the middle of the Keokuk. The brachiopod fauna associated with these trilobites is dominated by *Productus crawfordsvillensis* Weller, *Imbrexia montonana* Miller, *Rhynchopora beecheri* Greger, and *Torynifer pseudolineatus* (Hall). The lithologic character of the strata, which yielded the trilobites, is similar to that in which other North American species of *Griffithides* have been found. Moreover, the specimens of *Waribole*? recovered from the Keokuk are similar to pygidia I have recovered from the lime grainstones of the Salem Limestone of southern Indiana. These specimens from the Salem are also found in association with a species of *Griffithides.* The consistent occurrence of these two trilobite genera together in particular lithologies may suggests a strong ecologic control on their distribution.

Terminology employed in this study follows that utilized by Harrington (1959).

SYSTEMATIC PALEONTOLOGY

Family Proetidae Salter
Subfamily Griffithidinae Hupé
Genus *Griffithides* Portlock

Distribution of North American species.—Present in the Keokuk Limestone (Osagean) of Missouri and Illinois, the Salem Limestone (Meramecian) of Indiana, and the Pitkin Limestone (Chesterian) of Oklahoma.

Diagnosis of North American representatives.—Cephalon parabolic in outline, moderately vaulted. Glabella pyriform with frontal lobe moderately to greatly expanded laterally and reaching the anterior margin of the cranidium. Lateral preoccipital lobes well-defined, subtrian-

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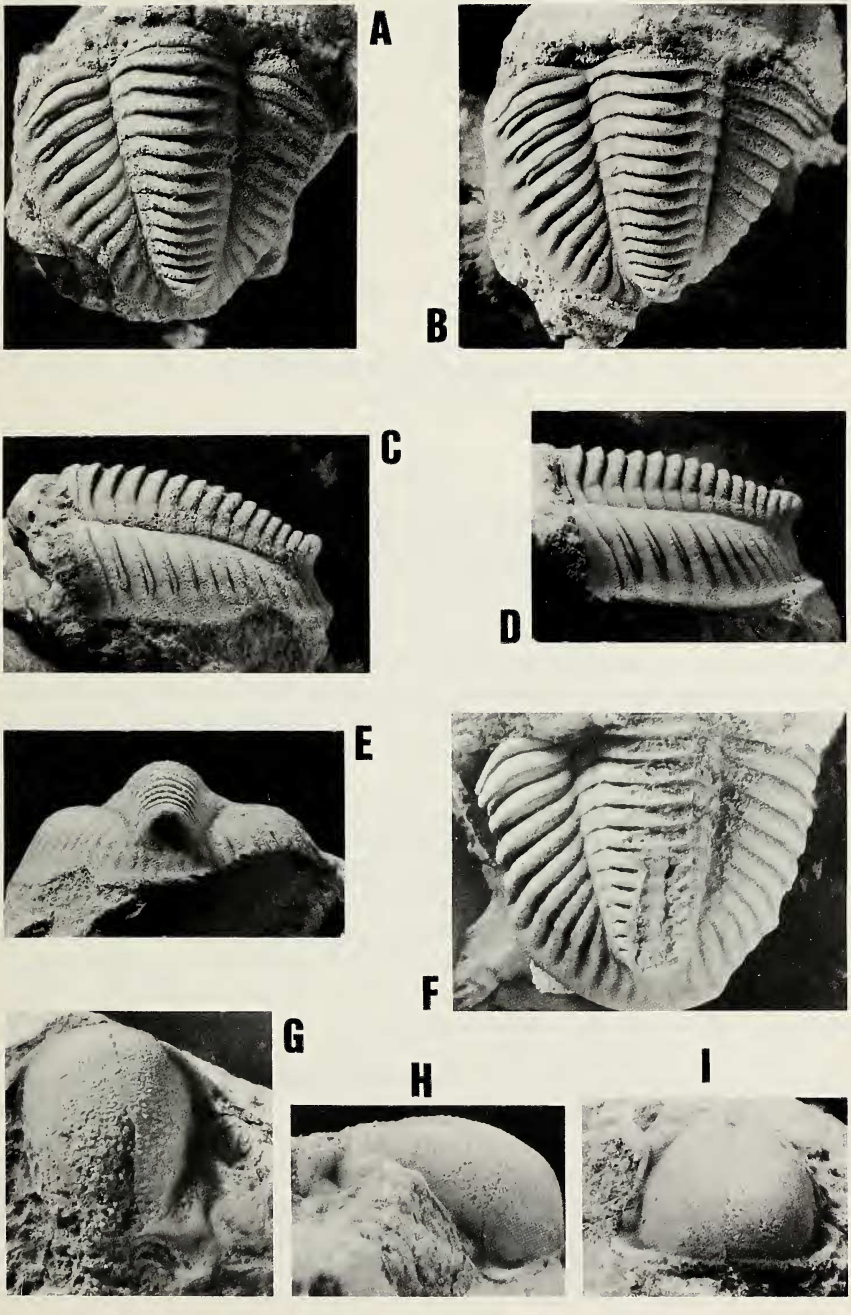
Fig. 1.—*Griffithides salinensis,* new species, A, C, E, holotype pygidium in dorsal, lateral, and posterior views, CMNH 34553, ×2; B, D, paratype pygidium in dorsal and lateral views, CMNH 34498, ×2; F, paratype pygidium, dorsal view, CMNH 34499, ×2.5; G, H, I, paratype cranidium in dorsal, lateral and anterior views, CMNH 34500, ×2.5.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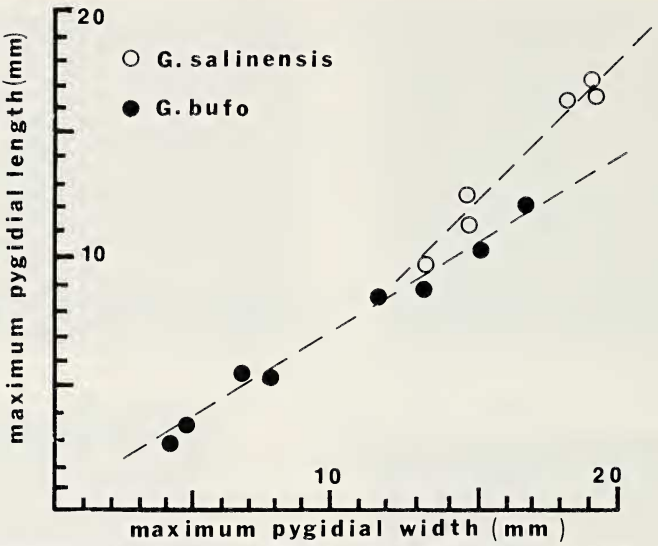

Fig. 2.—Bivariate plot of maximum pygidial width (W) vs maximum pygidial length (Z) for specimens of *Griffithides salinensis,* new species, and *G. bufo* Meek and Worthen.

gular, lp furrow narrow, deeply incised, widened anterolaterally. Palpebral lobes crescentic to semicircular in outline. Eyes of medium size, hemispherical in shape. Lateral border furrow well-defined and narrow, margin sharply rounded. Genal spines short, generally reaching to the third thoracic segment.

Thorax of nine segments, axial rings semicircular in transverse profile, ornamented by a row of small granules along the posterior margin. Pleurae sharply rounded at fulcrum, subangular at tip.

Pygidium semicircular to parabolic in outline, strongly vaulted, consisting of an axis composed of 11–15 rings and pleural fields of 9–14 ribs. Axis tapers posteriorly, does not reach posterior margin, strongly convex and steeply downsloping posteriorly. Pleural ribs extend nearly to the margin, with no well-defined border.

Discussion.—Although Hahn et al. (1983) were able to subdivide the Eurasian representatives of the genus *Griffithides* into three subgenera, no such division of North American species is possible. The main distinguishing features among North American species of *Griffithides* lie mainly in the shape (suboval versus parabolic) and structure (number of ribs and rings) of the pygidium. *Griffithides* can be distinguished from the contemporary trilobite genus *Paladin* by the presence of a well-developed pygidial border on the latter.

Table 1.—*Univariate measurements of select morphological characters of* Griffithides salinensis, *new species. For discussion and illustration of character definition see Shaw (1957).*

Character	N	Mean*	Range*
(W) pygidial width	7	16.2	12.7–19.6
(Z) pygidial length	7	13.4	10.1–16.8
(X) axial width (max.)	7	6.3	4.9–7.4
(Y) axial length	6	12.2	8.4–14.7
number of axial rings	6	15	14–15
number of axial ribs	5	14	13–14

* Measurements in millimeters.

Griffithides salinensis, new species
Figs. 1A–1I

Holotype.—CMNH 34553.
Paratypes.—CMNH 34498–34500.

Material.—10 incomplete pygidia and 1 partial cranidium.

Description.—Glabella pyriform with moderate lateral expansion to the frontal lobe. Frontal lobe strongly convex in transverse profile and extends to the anterior margin. In longitudinal profile glabella is nearly flat to mildly convex at the posterior terminus, becoming increasingly convex anteriorly, meeting the anterior margin vertically. Glabella covered by fine granules. Lateral preoccipital lobes subtriangular with granular ornament; lp furrow well-defined and of medium width, becoming broader toward the dorsal furrow. Palpebral lobes of medium size, semicircular in outline, inclined into the dorsal furrow at about 45° Facial sutures mildly divergent from α to β, rounded at β, wider at ω than α. Occipital lobe not preserved.

Thorax is unknown.

Pygidium parabolic in outline, moderately vaulted, .83 times as long as wide. Axis tapers posteriorly, .91 the total pygidial length, .39 the total pygidial (anterior) width, composed of 14 to 15 rings which are semicircular in transverse profile. Posteriormost axial ring is enlarged into a large node or nub that overhangs a slightly concave axial terminus. Each ring is slightly sinuous, being posteriorly bent across axis. A row of 12 fine granules ornament the posterior edge of each ring. Pleural fields strongly convex, made up of 13–14 posteriorly recurved ribs that extend nearly to the margin. The anteriormost three or four ribs exhibit a well-defined pleural furrow. A row of fine granules ornament each rib.

Discussion.—*G. salinensis,* new species, can readily be distinguished from other North American species of the genus by the upturned node-like termination of the pygidial axis, by the greater length to width ratio to the pygidium, and by the greater number of axial rings and pleural ribs. Only *G. bufo* Meek and Worthen has been recovered in sufficient number to allow any close comparison. Fig. 2 is a bivariate plot comparing the maximum pygidial widths with the maximum pygidial lengths for specimens of *G. salinensis* and *G. bufo.* There is a noticeable difference in the rectilinear trends exhibited by each species.

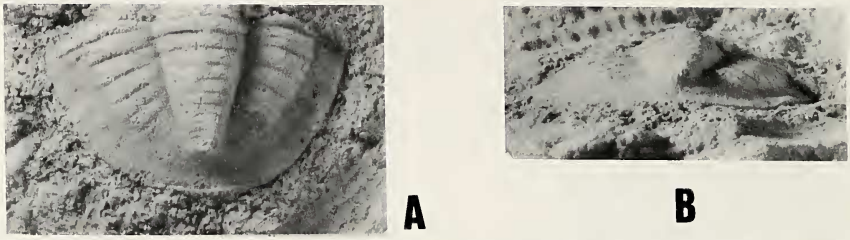

Fig. 3.—*Waribole*? sp. A, B, dorsal and posterior views of complete pygidium, CMNH 34501, ×.2.5.

The plot illustrates that *G. salinensis* possesses a greater length to width ratio than does *G. bufo* and is larger on the average. Unfortunately, insufficient numbers of *G. salinensis* are available at present to produce a reliable regression equation. *G. salinensis* differs from the poorly known *G. meramecensis* Shumard in that the latter exhibits fewer pygidial ribs and rings (12 and 13, respectively) and lacks the node-like termination of the axis. Both *G. meramecensis* and *G. salinensis* were recovered from the Keokuk Limestone of Missouri. The comparison presented above is based upon the drawing and description of *G. meramecensis* presented by Shumard (1855). Inasmuch as the location of the holotype is unknown, comparison must be based upon Shumard's description and drawing alone. *G. salinensis* differs from *G. pustulosus* Snider in that the pygidium of the former exhibits a parabolic outline and the prominent terminal node on the pygidial axis. All Eurasian species of *Griffithides* can be distinguished from *G. salinensis* by the terminal axial node on the pygidium.

Subfamily Cyrtosymbolinae Hupé
Genus ***Waribole*** Richter and Richter
Waribole? sp.
Fig. 3A, 3B

Material.—1 complete and 1 fragmented pygidium from the Keokuk Limestone. Illustrated specimen CMNH 34501.

Description.—Pygidium with low vaulting and relief, semicircular in outline with a length/width ratio of .65. Axis tapers posteriorly, is .85 the total pygidial length and .37 the maximum (anterior) pygidium width, composed of 11 rings and terminates, posteriorly, at inside margin of border. Pleural areas composed of six or perhaps seven ribs which become increasingly obsolete posteriorly. Each rib composed of two bands of approximately equal width. Border well-developed, smooth, and slightly concave to the margins, of nearly equal width all along pygidium.

Discussion.—The genus *Waribole* is most common in Late Devonian rocks and has a documented range into the earliest Carboniferous. The genus, to the best of my knowledge, has not been definitely documented

from the stratigraphic interval of the Keokuk Limestone (that is, Visean). Moreover, *Waribole* has not previously been reported from North America. If these specimens are in fact not specimens of *Waribole,* then they belong to some very similar genus. At present insufficient specimens are available to make any further inference. The only other North American trilobite genus with pygidial characteristics somewhat similar to these two pygidia is *Richterella*; *Richterella,* however, exhibits a much greater vaulting to the pygidium and the pleural ribs lack the subdivision into anterior and posterior bands.

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